PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:	H. Tanaka et al.
For:	SHOCK ABSORBING LANYARDS
Serial No.:	10/790,394
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Examiner:	Alvin C. Chin Shue
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DECLARATION OF TIM RUSSELL

UNDER 37 C.F.R. §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Tim Russell, declare the following.

1. I am a joint inventor of the invention disclosed in U.S. Patent Application Serial No. 10/790,394 titled SHOCK ABSORBING LANYARDS and filed in the U.S. Patent and Trademark Office on March 1, 2004 (the '394 application).

2. I am a joint inventor of the invention disclosed in U.S. Patent Application Serial No. 11/477,739 titled SHOCK ABSORBING LANYARDS and filed in the U.S. Patent and Trademark Office on June 29, 2006, which is a divisional application from the '394 application (the '739 application).

3. I am familiar with the '394 application and the '739 application.

4. One important feature of the shock absorbing lanyards of the '394 application is the heat shrunken elongation member which is elongatable and substantially inelastic after heat shrinking.

5. One important feature of the method of making the shock absorbing lanyards of the '739 application is heat shrinking the substantially inelastic elongation member and maintaining the inelasticity after heat shrinking.

6. The shock absorbing lanyards of the '394 and '739 applications exhibit unexpected results.

7. Actually, there is a rather important and dramatic unexpected result. The '394 and '739 applications disclose partially oriented yarn (POY yarn) as an example of the inelastic elongation member which is heat shrunken. The POY yarn was tested for elongation before and after heat treatment. Before heat treatment the POY yarn has a 92% elongation. Unexpectedly, however, the POY yarn has as much as 165% elongation after heat shrinking. I have been familiar with POY yarn for about four years and this dramatic and significant change in elongation percent of the POY yarn due to heat treatment was unexpected.

8. The dramatic and unexpected change in elongation of the POY yarn due to heat treatment is important for the shock absorbing lanyards I jointly invented. The heat treatment of the POY yarn altered the stress-strain curve of the POY yarn so that the POY yarn has significantly higher elongation. The unexpected significantly higher elongation of the POY yarn allowed development of a single lanyard that meets the fall protection requirements of multiple standards, namely USA (ANSI Z359), Canada (CSA E4 & E6), and Europe (BS/EN 355). Prior to the shock absorbing lanyards of the '394 and '739 applications, a single lanyard did not meet all three of those standards and a separate lanyard for each standard was necessary. A reason separate lanyards were necessary to meet the different standards is because of limited POY yarn elongation in the prior non-heat treated POY yarn lanyards.

9. The shock absorbing lanyards of the '394 and '739 applications have experienced remarkable commercial success during a short time period.

10. I am currently employed by TapeCraft Corporation and I have worked for TapeCraft for about four years. During the past four years I have been responsible for designing, developing and testing POY lanyards.

11. TapeCraft is selling the shock absorbing lanyards of the '394 and '739 applications. TapeCraft has sold approximately 30,000 of the shock absorbing lanyards over the past seventeen months. Two customers have completely switched over to TapeCraft's shock absorbing lanyard, one customer of which is believed to be the fourth largest customer in the safety lanyard market. Most of the major players in the shock absorbing lanyard market have formally asked for exclusive rights to TapeCraft's shock absorbing lanyard after the shock absorbing lanyard has been presented to them. TapeCraft has already entered into an exclusivity supply agreement for the shock absorbing lanyard with one customer.

12. The remarkable commercial success of the shock absorbing lanyard is due in large part because of benefits provided by heat shrinking the inelastic elongation member. The following paragraphs 13-16 demonstrate a nexus between the commercial success of the shock absorbing lanyard and heat shrinking the inelastic elongation member.

13. TapeCraft commissioned a market survey on the shock absorbing lanyard. I am familiar with the market survey and its results.

14. One customer, Solomon Marini, Aearo Corporation, stated in the market survey: "We are excited and interested in TapeCraft's POY lanyard because it will provide us with a cost advantage over our current method of making POY lanyards. TapeCraft's lanyards basically takes all of the labor out of the equation." The main reason TapeCraft's shock absorbing lanyard significantly removes labor from making the lanyard and thus, reduces the costs, is that heat shrinking the POY yarns (the inelastic elongation member) automatically adjusts the relative lengths between the POY yarns and the outer sheath. Manual labor adjustment of the relative lengths of the POY yarns and the outer sheath is no longer required because of the heat shrinking of the POY yarns.

15. Another customer, Francisco Barrientos, Hy-Safe Technology, stated in the market survey when referring to a lanyard not having the heat shrunken inelastic elongation member: "It takes us 20 minutes to assemble the shock absorbing member into the strength member of a POY lanyard. The same person does each of the steps in the

process. This is complete assembly including labels and hooks." Mr. Barrientos also stated in the market survey when referring to TapeCraft's lanyard having the heat shrunken inelastic elongation member: "In comparison it only took me 10 minutes to assemble the TapeCraft POY lanyard." The main reason TapeCraft's shock absorbing lanyard is significantly easier and less time consuming to assemble is that heat shrinking the POY yarns (the inelastic elongation member) automatically adjusts the relative lengths between the POY yarns and the outer sheath. Manual labor adjustment of the relative lengths of the POY yarns and the outer sheath is no longer required because of the heat shrinking of the POY yarns.

16. The commercial success of the shock absorbing lanyards of the '394 and '739 applications is mainly due to the heat shrunken inelastic elongation member. The heat shrunken inelastic elongation member automatically adjusts the relative lengths of the inelastic elongation member and the outer sheath rather than manually adjusting the relative lengths. The heat shrunken inelastic elongation member provides cost advantages because of the automatic adjustment instead of the more costly manual adjustment of previous lanyards.

17. There has been long-felt, unresolved needs for improved safety lanyards in the fall protection industry.

18. Fall protection safety lanyards have existed for quite some time. Many fall protection safety lanyards have (1) a component that elongates during a fall to absorb energy of the falling user and (2) a component that stops the user from falling and supports the load (weight) of the user. The relative lengths of the energy absorbing component and the load supporting component must be set properly for the safety lanyard to function.

19. There have been many attempts in the past to set the relative lengths of the energy absorbing component and the load supporting component. However, those past attempts have included manually setting the relative lengths of the energy absorbing component and the load supporting component. Needs have continued to exist to more efficiently set the relative lengths of the energy absorbing component and the load supporting component. For example, Jason White, Elk River, Inc., stated to

TapeCraft, prior to the filing of the '394 and '739 applications, that a one-piece shock absorbing lanyard would be "the Holy Grail of the fall protection industry." At that time existing shock absorbing lanyards were not made as one-piece webbings because the energy absorbing component and the load supporting component were separate and their relative lengths were manually adjusted.

20. The shock absorbing lanyards of the '394 and '739 applications are one-piece shock absorbing lanyards because the heat shrunken inelastic elongation member and the outer sheath are made as a one-piece webbing and the heat treatment automatically adjusts the relative lengths of the inelastic elongation member and the outer sheath.

21. There have been many failed attempts to produce a true one-piece lanyard. A long-term problem with making a one-piece lanyard has been how to adjust the relative lengths of the energy absorbing member and the strength member. The relative lengths of the energy absorbing member and the strength member have been adjusted by folding or gathering the strength member manually and then securing the two members together and then clipping off the excess energy absorbing member (POY yarns) manually. Such lanyards are not truly one-piece lanyards.

22. The shock absorbing lanyard having a heat shrunken inelastic elongation member was initially met with skepticism by an expert in the industry.

23. Prior to development of the shock absorbing lanyards of the '394 and '739 applications, TapeCraft consulted with Steven Kelen, an expert with several patents in the field of narrow fabrics. Mr. Kelen conducted a patent search and studied the technical problems of designing a one-piece shock absorbing lanyard. Mr. Kelen's advice was to forget about making a one-piece shock absorbing lanyard because it was impossible. Mr. Kelen particularly advised it was impossible to automatically adjust the relative lengths of the energy absorbing and strength members.

24. Faced with Mr. Kelen's expert advice that it was impossible to automatically adjust the relative lengths of the energy absorbing and strength members, we never-the-less invented the shock absorbing lanyards of the '394 and '739 applications. The shock absorbing lanyards we invented include the heat shrunken inelastic elongation member and the outer sheath which are made as a one-piece webbing and the heat

treatment automatically adjusts the relative lengths of the inelastic elongation member and the outer sheath.

25. The patent references Boyer, O'Dell and Driskell et al. cited in the Office Actions in the '394 and '739 applications do not disclose the shock absorbing lanyards of the '394 and '739 applications.

26. I have been informed that the U.S. Patent Office issued Office Actions in the '394 and '739 applications. I have also been informed that the Office Actions reject the patent claims in the '394 and '739 applications based Boyer (U.S. Patent No. 6,390,234), O'Dell (U.S. Patent No. 6,533,066) and Driskell et al. (U.S. Patent Application Publication No. 2003/0069557). I have also been informed that the Office Actions assert Driskell et al. is combinable with either Boyer and O'Dell. I have been informed that the Office Actions assert that when the heat treatment of Driskell et al. is combined with either one of Boyer and O'Dell, the combinations result in my invention. I have reviewed those patent references and disagree with the Office Actions.

27. First, I do not believe Driskell et al., particularly the heat treatment of Driskell et al., is combinable with either one of Boyer and O'Dell. Heat treatment of materials is well known across many industries. However, the heat treatment of materials is significantly different depending on the materials and the purposes for heat treatment. All heat treated materials and heat treatment processes are not alike. What is important to know about heat treatment is: what is the purpose of the heat treatment and what are the materials being heat treated?

28. In the case of Driskell et al., an absorbent garment or diaper has an elastic yarn which is laid between two materials and heat shrunken so the combined material will fit tight around the user's leg. In Driskell et al. the purpose of heat treating is that the combined material be elastic (stretchable and recoverable) to form leg gathers so the diaper can function for its intended purpose. It is important that the heat treated yarn retain its elastic properties after heat treatment. Also, there is no real important characteristic to be to be achieved or maintained regarding the other materials involved except that they be gathered.

29. Conversely, in Boyer and O'Dell the safety lanyards must be stretchable, but remain inelastic, i.e. not recoverable. Safety lanyards must be inelastic (not recoverable) so that they cannot be reused. Accordingly, it is against the purpose of safety lanyards to take the elastic heat treatment of the Driskell et al. diaper and combine it with the inelastic safety lanyards of Boyer or O'Dell. Indeed, such combinations would be dangerous and not meet industry safety standards.

30. As to the materials being heat treated, in safety lanyards, such as Boyer and O'Dell, the two materials (energy absorbing member and strength member) are not merely just gathered but must have carefully controlled relative lengths to be functional for their intended purposes. Conversely, in Driskell et al., the materials which form leg gathers of the diaper do not need to be carefully controlled as to their relative lengths. The diaper materials just need to form elastic leg gathers. Accordingly, the materials of Driskell et al. which are being heat treated are significantly different from the materials of Boyer and O'Dell.

31. Therefore, because of the significant differences in the purpose of the Driskell et al. diaper heat treatment and the significant differences in materials used for the Driskell et al. diaper, I do not believe one of ordinary skill in the art would combine Driskell et al. with Boyer or O'Dell.

32. However, even if the heat treatment for the diaper as described by Driskell et al. would be applied to Boyer or O'Dell, the combinations would not result in my lanyards. This is because the structures of the Boyer and O'Dell lanyards are not suitable for heat treatment.

33. Turning to Boyer, Boyer is a harness-lanyard combination. In column 3, beginning at line 20, Boyer describes a shock absorbing band comprising a flexible, deformable non-stretchable tubular sleeve and a non-resilient stretchable insert. However, there is no detail about how the two members are connected or even if they are connected. Without this detail there is no evidence heat treatment as described by Driskell et al. would have any gathering effect on Boyer's shock-absorbing band. Boyer clearly did not consider heat treatment because he made no allowances for it (connection of the two members) nor any mention of it in the description.

34. As to O'Dell, O'Dell beginning at column 4, line 10, describes that POY fibers are integrally woven in a flat section at one end of the lanyard and then woven separately in a tubular section. This structure would not work for heat treatment of the POY fibers. In order to utilize heat treatment to gather the two members they need to be integrally woven (connected) in at least two locations. O'Dell mentions just the one connection point, so heat treatment could not have worked. Beginning at column 2, line 8, O'Dell describes a rip stitch, which must not be confused with a method to connect the two members because the rip stitch is applied after the two members have been gathered manually (in other words, after the process heat treatment would have avoided). Heat treatment of the O'Dell lanyard, which has manually adjusted lengths of the two members, would result in a non-functional lanyard because without at least two connection points between the two members prior to heat treatment the outer sheath could not be gathered, no matter how much the POY shrunk. Without the second connection point at the opposite end of the lanyard prior to heat treatment there could be not a gathering effect. Therefore, the relative lengths of the strength member and the energy absorbing member could not be automatically adjusted.

35. Therefore, even if Driskell et al. is combined with Boyer or O'Dell, the combinations do not result in the lanyards of the '394 and '739 applications.

36. Furthermore, heat treatment in the lanyards of the '394 and '739 applications is used not just to gather the two materials (energy absorbing member and strength member) but to very precisely adjust their relative lengths. It is important that the POY yarn retain its energy-absorbing characteristic (stretchable, but not recoverable) and it is important that the outer tube not lose its characteristics (high strength, low stretch) during the heat treatment. Also, the lanyards of the '394 and '739 applications have several connection points along the lanyard to ensure the lanyard stretches uniformly over its length.

37. The lanyards of the '394 and '739 applications having heat shrunken inelastic elongation members can provide advantages. For example, a single lanyard can meet the fall protection requirements of multiple standards, namely USA (ANSI Z359), Canada (CSA E4 & E6), and Europe (BS/EN 355). Prior to the shock absorbing

lanyards of the '394 and '739 applications, a single lanyard did not meet all three of those standards and a separate lanyard for each standard was necessary. A reason separate lanyards were necessary to meet the different standards is because of limited POY yarn elongation in the prior non-heat treated POY yarn lanyards.

38. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: 07-25-2007 BY _____
Tim Russell